

Special Report

Tests of Different Samples of Pine Tar Oil on the Normal Skin and Wounds of Animals

(Dr. McGovern)

Materials Tested

Three samples of pine tar oil from the Retort Chemical Company of Gainesville, Florida were received on May 29, 1936. At the request of Mr. W. G. Bruce of the Division of Screw Worm Control, Mr. K. S. Littig had obtained these samples and designated them as Samples 1, 2, and 3. The history of these samples is given in the following statement submitted by Mr. Littig on May 27, 1936.

1936

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Statement on Pine Tar Oil Samples Obtained from Retort
Chemical Company, Gainesville, Florida.

May 27, 1936.

On May 26, 1936 Mr. Bruce requested 3 samples of two gallons each from representative drums of the second run of pine tar oil. These samples were obtained and will be taken to Valdosta by Mr. McGehee on May 28, 1936.

The pine tar oil was agitated somewhat in getting the drums in position for draining so these samples should be representative of that drum. The drums were arranged in no particular sequence so it was impossible to secure samples from any special point in the run. According to Mr. Haynes, manager of the plant, the entire run would be uniform for the material is not drained from the still until the entire run meets the desired specifications.

The samples are known to be taken from the second run. They were obtained under the supervision of the writer and he was able to identify this run as being the one referred to in previous writing as the "new run".

I talked at length with Mr. Haynes and learned from him that the original run was made under the specifications furnished by the Ducas Company. Mr. Haynes claims that this run met the specifications fully. He stated that the specifications were not explicit enough to secure the quality of pine tar oil that we required.

Here are the specifications of the first run:

1. Specific gravity - 1.065 (no temperature specified)
2. Free from uncombined water
3. Combined water not to exceed 2% by weight
4. Distillate @ 370° C. shall be at least 60%
5. Acid number 45-55
6. Tar acids designated as phenols 16-18%
7. Viscosity 60-90 sec. @ 50° C.
(Measuring instrument or weight not specified.)

Mr. Haynes said that as two ports were designated as shipping points, he assumed this run was for export trade.

We went to considerable trouble to test samples of this first run and noted extreme burning on several animals. The samples were obtained from drums shipped to different points in the state. About April 21 Mr. Brownlee and I went to the plant to obtain samples of pine tar oil for

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Here are the specifications of the first run:

1. Specific Gravity - 1.065 (no temperature specified)
 2. Free from uncombined water
 3. Combined water not to exceed 2% by weight
 4. Distillate @ 270° C. shall be at least 80%
 5. Acid number 45-55
 6. Tar acids designated as phenols 15-18%
 7. Viscosity 80-90 sec. @ 50° C.
- (Measuring instrument or weight not specified.)

Mr. Haynes said that as two ports were designated as shipping points, he assumed this run was for export trade.

We went to considerable trouble to test samples of this first run and noted extreme burning on several animals. The samples were obtained from drums shipped to different points in the state. About April 21 Mr. Brownlee and I went to the plant to obtain samples of pine tar oil for

biological tests. I noticed that Mr. Haynes did not give us material from the first run. On questioning him we learned that he had made a new run for us under their Specifications PT #400. Tests with this material did not produce severe burning. There was a little slipping of the hair and one blistered spot was found on one of the three calves tested. The irritated skin did not blister as much as was first indicated. Mr. Haynes did not state why he had made a new run for us. Here are the specifications of the new run:

Color	Golden brown
Specific gravity @ 15.5° C.	1.055 - 1.07 (1.065)
Moisture	Trace
Acetic acid	0.15% maximum
Acid number	45 - 55
Phenols	16% - 18%
Viscosity (Stormer-plain cup)	5 - 25 RPM @ 25° C. 50 Gram weight
Soluble in benzol	99.5%
Flash point open cup	125.5° C.
Fire point open cup	137.5° C.

Representative distillation:

IBP	124° C.	40%	299° C.
5%	205	50%	332
10%	213	60%	336
20%	236	70%	344
30%	278	80%	349

Mr. Haynes offers to replace all drums of the old run with material from the new run. He stated that his product meets U. S. P. specifications and is used for the most highly technical purposes. He stated that he did not receive the original inquiries and that he will make pine tar oil for us under any exact specifications that we may require from him. On the occasion of each visit I have made at his plant he has stated that a carload of pine tar oil had been shipped to Texas the week previous for use in screw worm control. These shipments have been made to private concerns. Last week's shipment was under their Specification PT #400. This pine tar oil has much of the water removed by presettling before distillation. The pine tar oil is filtered before it is put in drums.

I have tried to state the above matter as Mr. Haynes presented it to me. Notes were taken of everything of importance he said to me. I have not tried to explain why 55 drums of the material were shipped out of the old run and then a new run made. Previous to the making of the new run we did not inform Mr. Haynes that the old run caused burning. I visited the plant with Dr. Bishopp a short time after the first run was made. Mr. Haynes was informed at that time as to what use the pine

biological tests. I noticed that Mr. Haynes did not give an material from the first run. On questioning him we learned that he had made a new run for us under their specifications PT 400. Tests with this material did not produce severe burning. There was a little slipping of the belt and one blistered spot was found on one of the three calves tested. The blistered skin did not blister as much as was first indicated. Mr. Haynes did not state why he had made a new run for us. Here are the specifications of the new run:

Color
Specific Gravity 1.030 - 1.035
(1.033)

Moisture	Acetic acid	Alid number	Phenols	Viscosity (former)	Alid cup	Soluble in benzol	Flash point	Fire point
Trace	0.15% maximum	45 - 55	100 - 150	5 - 25 mm @ 25°C	50 Gram weight	99.5% min	125.5°C	137.5°C

Representative distillation:
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
5%
0%
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
5%
0%

Mr. Haynes offers to replace all drums of the old run with material from the new run. He stated that his product meets U. S. P. specifications and is used for the most highly technical purposes. He stated that he did not receive the original industries and that he will make pine tar oil for us under any exact specifications that we may require from him. On the occasion of each visit I have made at his plant he has stated that a barrel of pine tar oil had been shipped to Texas the week previous for use in screw worm control. These shipments have been made to private concerns. Last week's shipment was under their specification PT 400. This pine tar oil has much of the water removed by presettling before distillation. The pine tar oil is filtered before it is put in drums.

I have tried to state the above matter as Mr. Haynes presented it to me. Notes were taken of everything of importance he said to me. I have not tried to explain why 35 drums of the material were shipped out of the old run and then a new run made. Previous to the making of the new run we did not inform Mr. Haynes that the old run caused burning. I visited the plant with Mr. Bishop a short time after the first run was made. Mr. Haynes was informed at that time as to what was the pine tar oil shipped to different points in the water. About April 1st, 1934, I went to the plant to obtain samples of pine tar oil for

tar oil was to be put. He was informed by Dr. Bishopp of the necessity of dehydration. I believe that this report will cover everything I know concerning this subject.

Submitted May, 27, 1936

K. S. Littig,
Agent,
Division of Screw Worm Control.

KSL-gm

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About June 10, 1936, a sample of pine tar oil was received from the American Turpentine and Tar Company of New Orleans, Louisiana. This pine tar oil was especially prepared for the treatment of wounds on animals to prevent screw worm attack and was marketed under the trade name of "Pine-Trel". The "Pine-Trel" received in June 1936 was designated as 1936 stock to distinguish it from similar material obtained in 1935 which was called 1935 stock. This latter material was used only to a very limited extent in these tests. The trade name "Pine-Trel" is used in this report for brevity.

Viscosity and Specific Gravity of the Pine Tar Oils Tested.

In order to obtain an approximate comparison of the viscosities of these five samples of pine tar oil 50 grams of each were put in a glass funnel that held about 140 cc of water when full. The stem of this funnel was 145 mm long and 4 mm in diameter. The seconds required for 25 grams of the 50 grams of pine tar oil put in the funnel to flow thru the stem of this funnel, was recorded. Three series of tests were made of the rate of flow with each sample on different days. Three observations were made on each sample in each series, which made a total of nine observations on each sample of pine tar oil. The tests were run at room temperature and pressure. The temperature varied from 29° C. to 33° C. but as all the samples were run at each temperature the following results give a fair comparison of the rate of flow of the five samples in the temperature range tested.

Retort Sample 1	---	58 seconds
" " 2	---	56 "
" " 3	---	51 "
"Pine-trel" 1936	---	209 "
" " 1935	---	171 " .

These tests of the rate of flow indicate that the three samples of Retort pine tar oil have about the same viscosity, which appears to be much

About June 10, 1936, a sample of pine tar oil was received from the American Turpentine and Tar Company of New Orleans, Louisiana. This pine tar oil was especially prepared for the treatment of wounds on animals to prevent screw worm attack and was marketed under the trade name of "Pine-Trol". The "Pine-Trol" received in June 1936 was designated as 1936 stock to distinguish it from similar material obtained in 1935 which was called 1935 stock. This latter material was used only to a very limited extent in these tests. The trade name "Pine-Trol" is used in this report for brevity.

Viscosity and Specific Gravity of the Pine Tar Oils Tested.

In order to obtain an approximate comparison of the viscosities of these five samples of pine tar oil 50 grams of each were put in a glass funnel that held about 140 cc of water when full. The stem of this funnel was 145 mm long and 4 mm in diameter. The seconds required for 25 grams of the 50 grams of pine tar oil put in the funnel to flow thru the stem of this funnel, was recorded. Three series of tests were made of the rate of flow with each sample on different days. Three observations were made on each sample in each series, which made a total of nine observations on each sample of pine tar oil. The tests were run at room temperature and pressure. The temperature varied from 29° C. to 33° C. but as all the samples were run at each temperature the following results give a fair comparison of the rate of flow of the five samples in the temperature range tested.

Refert Sample 1	---	58 seconds
" " 2	---	" 56
" " 3	---	" 51
"Pine-Trol" 1936	---	" 509
" " 1935	---	" 171

These tests of the rate of flow indicate that the three samples of Refert pine tar oil have about the same viscosity, which appears to be much

lower than that of the "Pine-Trel" at the temperatures tested. These temperatures were probably somewhat lower than the maximum that would exist in the field when screw worms are active. A possible explanation of the faster rate of flow of the "Pine-Trel" 1935 stock as compared with the 1936 stock of the same material was that the 1935 "Pine-Trel" had been standing in a drum for almost a year and the material that was taken out of it was drawn from the bottom of the drum. The heavier and more viscous material may have settled to the bottom of the drum and had been drawn off which would have left only the lighter and faster flowing material in the drum at the time these tests were run.

In order to determine approximately the specific gravity of the samples of pine tar oil two flasks that held 149.2 grams of distilled water at 33° C. were used. Duplicate weighings were made of each sample at room temperature. The first weighing of each sample was made at 33° C. and the second at 32° C. The maximum variation between two weighings of the same sample was 1 gram, or a variation of less than 0.7 of one percent. The specific gravity of the distilled water at 33° C. is approximately 1.0. The results follow.

Pine Tar Oil				Average weight		Specific Gravity
Retort Sample 1	---			157.65	---	1.057
" " 2	---			157.50	---	1.056
" " 3	---			157.45	---	1.055
"Pine-Trel" 1936	---			158.50	---	1.062
" " 1935	---			158.25	---	1.061

As the specific gravity of water at 33° C. is slightly less than 1.0 the specific gravities of the pine tar oils as given here are probably a trifle high. However, as a matter of comparison the Retort samples seemed to be slightly lighter than the "Pine-Trel" material. As neither the viscosity nor the specific gravity determinations were with standard equipment or at

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 lower than that of the "Pine-Trel" at the temperatures tested. These
 temperatures were probably somewhat lower than the maximum that would
 exist in the field when screw worms are active. A possible explanation of the
 faster rate of flow of the "Pine-Trel" 1935 stock as compared with the 1936
 stock of the same material was that the 1935 "Pine-Trel" had been standing
 in a drum for almost a year and the material that was taken out of it was
 drawn from the bottom of the drum. The heavier and more viscous material
 may have settled to the bottom of the drum and had been drawn off which
 would have left only the lighter and faster flowing material in the drum
 at the time these tests were run.

In order to determine approximately the specific gravity of the samples
 of pine tar oil two flasks that held 149.8 grams of distilled water at 33° C.
 were used. Duplicate weighings were made of each sample at room temperature.
 The first weighing of each sample was made at 33° C. and the second at 33° C.
 The maximum variation between two weighings of the same sample was 1 gram,
 or a variation of less than 0.7 of one percent. The specific gravity of the
 distilled water at 33° C. is approximately 1.0. The results follow.

Pine Tar Oil	Average weight	Specific Gravity
Refert Sample 1	127.82	1.037
" " 2	127.80	1.036
" " 3	127.48	1.033
" " 4	128.80	1.032
" " 5	128.32	1.031

As the specific gravity of water at 33° C. is slightly less than 1.0
 the specific gravities of the pine tar oils as given here are probably a
 trifle high. However, as a matter of comparison the Refert samples seemed
 to be slightly lighter than the "Pine-Trel" material. As neither the viscosity
 nor the specific gravity determinations were with standard equipment or at

standard temperatures, these results only give a rough comparison of these two characteristics of the samples of pine tar oil tested.

Method and Amount of Pine Tar Oil Applied.

A 1-inch paint brush was dipped into the pine tar oil until the entire length of the bristles was submerged. The brush was then wiped twice on each side on a clean paper towel and the amount of pine tar oil left on the towel was weighed. After some preliminary weighings to obtain a uniform technique, ten weighings were made of each material tested. The temperature varied from 30° C. to 34° C. However, as all the samples were weighed at various temperatures, the following results which were obtained were fairly comparable.

Retort Sample 1	---	2.3 gms.
" " 2	---	2.3 gms.
" " 3	---	2.5 gms.
"Pine-Trel" 1936 stock	---	3.1 gms.
" " 1935 "	---	3.2 gms.

Since in applying the pine tar oil to the animals a 1-inch paint brush was dipped in the material and the pine tar oil adhering to the brush was painted on an area about 3 inches in diameter, the figure above will give the approximate amount that was applied each time an area was treated. This amount was referred to as one brushful. This was the amount that was applied at each treatment on each area treated on each animal, except the first treatment in the first series when two brushfuls were applied to each area.

The difference of one or two tenths of a gram are probably not significant in the amount of pine tar oil applied. However, the difference of seven or eight tenths of a gram between the amount of "Pine-Trel" applied at each brushful and the amount of Retort pine tar oil applied probably indicated that slightly more "Pine-Trel" was applied at each application than Retort pine tar oil.

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The hair on half the area treated with the pine tar oil was clipped except the ears and the areas behind the fore legs. After the treatment was applied the material spread to cover a much larger area and ran down the side of the animal below the treated area. This increase in the area covered by a treatment was probably due to the heat of the sun warming the pine tar oil and reducing its viscosity so that it spread out in a much larger but thinner coat over the skin and hair than when originally applied.

Animals Treated.

All the calves were treated on six areas. An area on the dorsal surface of each shoulder and hip and an area behind each fore leg at the bottom line of the animal were treated.

Both ears were painted inside and outside on all the sheep.

The goats without wounds were treated on both shoulders and both hips. The goats with fresh wounds were treated to cover the wounds which were located one on each shoulder and one on each hip. The goats with wounds on the left shoulder, that had been infested with C. americana larvae, were treated to cover the wounds and clipped areas on the hips. Seven applications were made on seven consecutive days to all the animals except the goats which had wounds that had been infested with screw worms. These animals were treated twice a week, on Monday and Thursday, until the wounds healed.

The abbreviations used to designate the areas treated were as follows:

R. S. - Right Shoulder; R. H. - Right Hip; L. S. - Left Shoulder; L. H. - Left Hip; R. F. - Behind Right Fore Leg; L. F. - Behind Left Fore Leg; R. E. - Right Ear; L. E. - Left Ear.

In series 1 the first treatment was applied on June 24, 1936 and the last treatment was applied on June 30, 1936. None of these animals were wounded.

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In series I the first treatment was applied on June 24, 1936 and the last treatment was applied on June 30, 1936. None of these animals were wounded.

133. Calf, black bull, weight about 300 lbs. R. S. "Pine-Trel" 1936;

R. H. Retort Sample 1; L. S. Retort Sample 2; L. H. Retort Sample 3;

R. F. Retort Sample 1; L. F. "Pine-Trel" 1936.

134. Calf, brown bull, weight about 250 lbs. R. S. Retort Sample 1;

R. H. Retort Sample 2; L. S. Retort Sample 3; L. H. "Pine-Trel" 1936;

R. F. "Pine-Trel" 1936; L. F. Retort Sample 2.

47. Sheep, white, weight 45 lbs. R. E. Retort Sample 1; L. E.

"Pine-Trel" 1936.

135. Sheep, white, weight 48 lbs. R. E. Retort Sample 2;

L. E. "Pine-Trel" 1936.

136. Sheep, white, weight 49 lbs. R. E. Retort Sample 3;

L. E. "Pine-Trel" 1936.

137. Goat, white, weight 52 lbs. R. H. Retort Sample 1; R. S. "Pine-Trel"

1936; L. S. "Pine-Trel" 1936; L. H. "Pine-Trel" 1936.

138. Goat, white, weight 47 lbs. R. S. "Pine-Trel" 1936; R. H. "Pine-Trel"

1936; L. S. "Pine-Trel" 1936; L. H. Retort Sample 2.

139. Goat, white, weight 48 lbs. R. S. "Pine-Trel" 1936; R. H. Retort

Sample 3; L. S. "Pine-Trel" 1936; L. H. "Pine-Trel" 1936.

In series 2 the first treatment was applied on July 1, 1936 and last treatment on July 7, 1936. None of these animals were wounded.

152. Calf, black bull, weight about 300 lbs. R. S. Retort Sample 1;

R. H. Retort Sample 2; L. S. Retort Sample 3; L. H. "Pine-Trel" 1936;

R. F. Retort Sample 3; L. F. "Pine-Trel" 1936.

153. Calf, red and white bull, weight about 200 lbs. R. S. Retort Sample 2;

R. H. Retort Sample 3; L. S. "Pine-Trel" 1936; L. H. Retort Sample 1;

R. F. "Pine-Trel" 1936; L. F. Retort Sample 1.

154. Sheep, white, weight 40 lbs. R. E. "Pine-Trel" 1936; L. E. Retort

Sample 1.

132. Calf, black bull, weight about 300 lbs. N. S. "Pine-Tree" 1935;

N. H. Retort Sample 1; L. S. Retort Sample 2; L. H. Retort Sample 3;

N. F. Retort Sample 1; L. F. "Pine-Tree" 1935.

134. Calf, brown bull, weight about 300 lbs. N. S. Retort Sample 1;

N. H. Retort Sample 2; L. S. Retort Sample 3; L. H. "Pine-Tree" 1935;

N. F. "Pine-Tree" 1935; L. F. Retort Sample 2.

47. Sheep, white, weight 45 lbs. N. S. Retort Sample 1; L. H.

"Pine-Tree" 1935.

135. Sheep, white, weight 45 lbs. N. H. Retort Sample 2;

L. S. "Pine-Tree" 1935.

136. Sheep, white, weight 45 lbs. N. S. Retort Sample 2;

L. S. "Pine-Tree" 1935.

137. Goat, white, weight 55 lbs. N. H. Retort Sample 1; N. S. "Pine-Tree"

1935; L. S. "Pine-Tree" 1935; L. H. "Pine-Tree" 1935.

138. Goat, white, weight 45 lbs. N. S. "Pine-Tree" 1935; N. F. "Pine-Tree"

1935; L. S. "Pine-Tree" 1935; L. H. Retort Sample 2.

139. Goat, white, weight 45 lbs. N. S. "Pine-Tree" 1935; N. H. Retort

Sample 2; L. S. "Pine-Tree" 1935; L. H. "Pine-Tree" 1935.

In series 2 the first treatment was applied on July 1, 1935 and last

treatment on July 7, 1935. None of these animals were wounded.

140. Calf, black bull, weight about 300 lbs. N. S. Retort Sample 1;

N. H. Retort Sample 2; L. S. Retort Sample 3; L. H. "Pine-Tree" 1935;

N. F. Retort Sample 1; L. F. "Pine-Tree" 1935.

141. Calf, red and white bull, weight about 300 lbs. N. S. Retort Sample 2;

N. H. Retort Sample 3; L. S. "Pine-Tree" 1935; L. H. Retort Sample 1;

N. F. "Pine-Tree" 1935; L. F. Retort Sample 1.

142. Sheep, white, weight 45 lbs. N. S. "Pine-Tree" 1935; N. H. Retort

Sample 1.

155. Sheep, white, weight 40 lbs. R. E. "Pine-Trel" 1936;

L. E. Retort Sample 2.

156. Sheep, white, weight 38 lbs. R. E. "Pine-Trel" 1936;

L. E. Retort Sample 3.

157. Goat, white, weight 64 lbs. R. S. Retort Sample 1;

R. H. "Pine-Trel" 1936; L. S. "Pine-Trel" 1936; L. H. "Pine-Trel" 1935.

158. Goat, white, weight 64 lbs. R. S. Retort Sample 2;

R. H. "Pine-Trel" 1936; L. S. "Pine-Trel" 1936; L. H. "Pine-Trel" 1935.

159. Goat, white, weight 59 lbs. R. S. "Pine-Trel" 1936;

R. H. "Pine-Trel" 1935; L. S. Retort Sample 3; L. H. "Pine-Trel" 1936.

In series 3 the first treatment was applied on July 8 and the last treatment on July 14. The calves and sheep in this series were not wounded. The goats were wounded on all four quarters without clipping the hair. A cut about $1\frac{1}{2}$ inches long was made just thru the skin and the treatments applied to cover these wounds.

172. Calf, black and white steer, weight about 250 lbs. R. S. Retort

Sample 3; R. H. "Pine-Trel" 1936; L. S. Retort Sample 1; L. H. Retort Sample 2; R. F. Retort Sample 2; L. F. "Pine-Trel" 1936.

173. Calf, brown and white steer, weight about 200 lbs. R. S. Retort

Sample 2; R. H. Retort Sample 1; L. S. "Pine-Trel" 1936; L. H. Retort Sample 3; R. F. "Pine-Trel" 1936; L. F. Retort Sample 3.

174. Sheep, white, weight 115 lbs. R. E. "Pine-Trel" 1936;

L. E. Retort Sample 1.

175. Sheep, white, weight 104 lbs. R. E. "Pine-Trel" 1936;

L. E. Retort Sample 2.

176. Sheep, white, weight 88 lbs. R. E. "Pine-Trel" 1936;

L. E. Retort Sample 3.

155. Sheep, white, weight 40 lbs. R. E. "Pine-Trel" 1935;
L. E. Retort Sample 2.

156. Sheep, white, weight 38 lbs. R. E. "Pine-Trel" 1935;
L. E. Retort Sample 2.

157. Goat, white, weight 64 lbs. R. E. Retort Sample 1;
R. E. "Pine-Trel" 1935; L. E. "Pine-Trel" 1935;

158. Goat, white, weight 64 lbs. R. E. Retort Sample 2;
R. E. "Pine-Trel" 1935; L. E. "Pine-Trel" 1935;

159. Goat, white, weight 59 lbs. R. E. "Pine-Trel" 1935;
R. E. "Pine-Trel" 1935; L. E. Retort Sample 2; L. E. "Pine-Trel" 1935.

In series 3 the first treatment was applied on July 8 and the last treatment on July 14. The calves and sheep in this series were not wounded. The goats were wounded on all four quarters without clipping the hair. A cut about 1 1/2 inches long was made just thru the skin and the treatments applied to cover these wounds.

172. Calf, black and white steer, weight about 250 lbs. R. E. Retort Sample 2; R. E. "Pine-Trel" 1935; L. E. Retort Sample 1; L. E. Retort Sample 2; R. E. Retort Sample 2; L. E. "Pine-Trel" 1935.

173. Calf, brown and white steer, weight about 200 lbs. R. E. Retort Sample 2; R. E. Retort Sample 1; L. E. "Pine-Trel" 1935; L. E. Retort Sample 2; R. E. "Pine-Trel" 1935; L. E. Retort Sample 2.

174. Sheep, white, weight 115 lbs. R. E. "Pine-Trel" 1935;
L. E. Retort Sample 1.

175. Sheep, white, weight 104 lbs. R. E. "Pine-Trel" 1935;
L. E. Retort Sample 2.

176. Sheep, white, weight 88 lbs. R. E. "Pine-Trel" 1935;
L. E. Retort Sample 2.

177. Sheep, white, weight 40 lbs. R. E. "Pine-Trel" 1935;
L. E. Retort Sample 2.

177. Goat, red, weight 127 lbs. R. S. Retort Sample 1; R. H. "Pine-Trel" 1936; L. S. Retort Sample 2; L. H. Retort Sample 3

178. Goat, white, weight 80 lbs. R. S. Retort Sample 3; R. H. Retort Sample 2; L. S. Retort Sample 1; L. H. "Pine-Trel" 1936.

179. Goat, white, weight 100 lbs. R. S. Retort Sample 3; R. H. Retort Sample 2; L. S. "Pine-Trel" 1936; L. H. Retort Sample 1.

Series 4 - In series 4 only goats were used. These animals all had wounds on the left shoulder that had been infested with C. americana larvae. Retort pine tar oil or "Pine-Trel" 1936 was applied to cover the wound, the surrounding skin and hair, and the normal clipped skin on the right hip of each goat. The left hip was treated with "Pine-Trel" 1935. Treatments were applied to twelve goats. Each sample was applied to one goat starting on June 29, July 6 and 13.

The following goats were treated.

1. Retort Sample 1 was applied to goats 121, 143, and 162.
2. Retort Sample 2 was applied to goats 122, 144 and 163.
3. Retort Sample 3 was applied to goats 123, 145 and 167.
4. "Pine-Trel" 1936 was applied to goats 124, 150 and 169.

Results

Calves - The results on the same areas on all the calves with both the Retort Samples and the "Pine-Trel" 1936 were the same. On the third or fourth day all the treated areas became sore to the touch or when the hair was pulled gently. The areas behind the fore legs and on the shoulders began to crack from the seventh to the twelfth day after treatment started. Most of the cracks were in a vertical direction and by the fourteenth to twenty-first day, depending on the animal and not the treatment, most of the hair and the outer layer of skin peeled off. During this time when the skin was peeling

177. Goat, red, weight 127 lbs. R. S. Retort Sample 1; R. H. "Pine-

Trel" 1936; L. S. Retort Sample 2; L. H. Retort Sample 3

178. Goat, white, weight 80 lbs. R. S. Retort Sample 2; R. H. Retort

Sample 3; L. S. Retort Sample 1; L. H. "Pine-Trel" 1936.

179. Goat, white, weight 100 lbs. R. S. Retort Sample 2; R. H. Retort

Sample 3; L. S. "Pine-Trel" 1936; L. H. Retort Sample 1.

Series 4 - In series 4 only goats were used. These animals all had

wounds on the left shoulder that had been infested with *C. americanus* larvae.

Retort pine tar oil or "Pine-Trel" 1936 was applied to cover the wound, the

surrounding skin and hair, and the normal clipped skin on the right hip of

each goat. The left hip was treated with "Pine-Trel" 1936. Treatments

were applied to twelve goats. Each sample was applied to one goat starting

on June 20, July 6 and 13.

The following goats were treated.

1. Retort Sample 1 was applied to goats 121, 145, and 162.

2. Retort Sample 2 was applied to goats 122, 144 and 163.

3. Retort Sample 3 was applied to goats 123, 146 and 164.

4. "Pine-Trel" 1936 was applied to goats 124, 150 and 165.

Results

Calves - The results on the same areas on all the calves with both the

Retort Samples and the "Pine-Trel" 1936 were the same. On the third or fourth

day all the treated areas became sore to the touch or when the hair was pulled

gently. The areas behind the fore legs and on the shoulders began to crack

from the seventh to the twelfth day after treatment started. Most of the

cracks were in a vertical direction and by the fourteenth to twenty-first

day, depending on the animal and not the treatment, most of the hair and the

outer layer of skin peeled off. During this time when the skin was peeling

off some small blood scabs were observed on some of the animals. By the twenty-eighth day after the application of pine tar oil had been started the treated area had peeled and a new growth of hair was developing. The treated areas on the hips did not crack as noticeably as on the shoulders, but the hair and outer layer of skin peeled off at about the same time and in the same manner. Calves with white skins sunburned after the hair and outer layer of skin had come off with the pine tar oil. These areas were sore and later peeled again due to the sunburn.

For a more exact portrayal of the injury produced by all the samples of pine tar oil that were applied to the calves, your attention is called to the photographs that form a part of this report.

Sheep - All the samples of pine tar oil tested produced similar effects on the ears of sheep. About twelve to fourteen days after treatment started the wool became loose. By the twenty-first day, after treatment began, the ears were peeling leaving white skin exposed with fine short wool on it. A week later the wool had begun to grow back on the ears. No cracking or blood scabs were observed.

Goats - The hair and outer layer of skin on the 5 goats that were not wounded and the 3 goats that had fresh wounds became loose in from 10 to 15 days after treatment started. No practical difference could be observed between any of the samples tested. While the treated areas peeled on all the goats treated seven times, it was a slow process and no cracking of the skin or blood scabs were observed on the normal treated skin. The fresh wounds on these goats healed rather uniformly. Goat 177 had completely healed when this report was submitted and the other two animals were almost completely healed. The wound on Goat 178 that was treated with Retort Sample 1 became infested with C. americana larvae on the fourteenth day after treatment started.

off some small blood scabs were observed on some of the animals. By the twenty-eighth day after the application of pine tar oil had been started the treated areas had healed and a new growth of hair was developing. The treated areas on the hips did not crack as noticeably as on the shoulders, but the hair and outer layer of skin peeled off at about the same time and in the same manner. Calves with white skins sunburned after the hair and outer layer of skin had come off with the pine tar oil. These areas were sore and later healed again due to the sunburn.

For a more exact portrayal of the injury produced by all the samples of pine tar oil that were applied to the calves, your attention is called to the photographs that form a part of this report.

Sheep - All the samples of pine tar oil tested produced similar effects on the ears of sheep. About twelve to fourteen days after treatment started the wool became loose. By the twenty-first day, after treatment began, the ears were peeling leaving white skin exposed with fine short wool on it. A week later the wool had begun to grow back on the ears. No cracking or blood scabs were observed.

Goats - The hair and outer layer of skin on the 6 goats that were not wounded and the 3 goats that had fresh wounds became loose in from 10 to 15 days after treatment started. No practical difference could be observed between any of the samples tested. While the treated areas peeled on all the goats treated seven times, it was a slow process and no cracking of the skin or blood scabs were observed on the normal treated skin. The fresh wounds on these goats healed rather uniformly. Goat IV had completely healed when this report was submitted and the other two animals were almost completely healed. The wound on Goat IVB that was treated with Retort 100 Sample A became infected with C. aerogenes larvae on the fourteenth day after treatment started. The wound on Goat IVB that was treated with Retort 100

The twelve goats with wounds that had been infested with C. americana larvae healed rather uniformly. There was no evidence that any of the samples tested retarded healing or injured the wound in any way. About two-thirds of the wounds had healed when this report was written. The wounds on Goat 144 that was treated with Retort Sample 2 had become re-infested once and the wounds on Goats 145 and 167 that was treated with Retort Sample 3 have become reinfested twice to date. No reinfestations have yet occurred on wounds treated with Retort Sample 1 or "Pine-Trel" 1936.

The hair and outer layer of skin on these goats that were treated twice a week did not become loose as soon as on the goats that were treated daily. On two goats, whose wounds healed completely after four applications of pine tar oil and on one goat, that received six treatments, the hair became only slightly loose. The hair was often slightly loose on the normal untreated skin of goats. On the other goats that received five or more treatments, the hair became loose.

Summary

Three samples of pine tar oil that were made by the Retort Chemical Company and one sample of pine tar oil that was made by the American Turpentine and Tar Company especially for treating wounds on animals, were applied to the normal skin of six calves, six goats and the ears of nine sheep. The same materials were also applied to fresh wounds on three goats and wounds that had been infested with screw worms on twelve goats. The hair and outer layer of skin became loose and peeled off the treated areas on all the animals used except three of the wounded goats. No appreciable

The twelve goats with wounds that had been infested with C. americanus

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samples tested retarded healing or injured the wound in any way. About

two-thirds of the wounds had healed when this report was written. The

wound on Goat 144 that was treated with Retort Sample 2 had become re-

infested once and the wounds on Goats 143 and 147 that were treated with

Retort Sample 3 have become reinfested twice to date. No reinfestations have

yet occurred on wounds treated with Retort Sample 1 or "Pine-Tar" 1936.

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hair and outer layer of skin became loose and peeled off the treated areas

on all the animals used except three of the wounded goats. No appreciable

difference could be observed between the effects produced by any of the four samples. Wounds on goats treated with each of the samples healed satisfactorily.

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difference could be observed between the effects produced by any of the four samples. Wounds on goats treated with each of the samples healed satisfactorily.

The results of the tests conducted with the samples are as follows:

1. The samples were tested on goats with wounds of the following nature:

2. The wounds were treated with the samples in the following manner:

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3. The results of the tests are as follows:

4. The wounds on goats treated with the samples healed in the following manner:

5. The wounds on goats treated with the samples healed in the following manner:

6. The wounds on goats treated with the samples healed in the following manner:

7. The wounds on goats treated with the samples healed in the following manner:

8. The wounds on goats treated with the samples healed in the following manner:

9. The wounds on goats treated with the samples healed in the following manner:

10. The wounds on goats treated with the samples healed in the following manner:

11. The wounds on goats treated with the samples healed in the following manner:

12. The wounds on goats treated with the samples healed in the following manner:

13. The wounds on goats treated with the samples healed in the following manner:

14. The wounds on goats treated with the samples healed in the following manner:

15. The wounds on goats treated with the samples healed in the following manner:

16. The wounds on goats treated with the samples healed in the following manner:

17. The wounds on goats treated with the samples healed in the following manner:

18. The wounds on goats treated with the samples healed in the following manner:

19. The wounds on goats treated with the samples healed in the following manner:

20. The wounds on goats treated with the samples healed in the following manner:

21. The wounds on goats treated with the samples healed in the following manner:

22. The wounds on goats treated with the samples healed in the following manner:

23. The wounds on goats treated with the samples healed in the following manner:

24. The wounds on goats treated with the samples healed in the following manner:

25. The wounds on goats treated with the samples healed in the following manner:

26. The wounds on goats treated with the samples healed in the following manner:

27. The wounds on goats treated with the samples healed in the following manner: